

Falls Lake Dam Hydroelectric Project Joint Meeting



January 23, 2012

Meeting Goals

- **Provide Description of Project**
- **Explain Regulatory Process**
- **Provide Overview of the PAD**
- **Answer Your Questions**
- **Solicit Comments**

Agenda

- **Overview of Project**
 - **Background on Falls Lake and Dam Operation**
 - **Concept for Hydropower Facility**
 - **Proposed Operations**
- **Overview of Traditional Licensing Process**
- **Overview of Pre-Application Document**
- **Schedule**
- **Stakeholder Input**

Project Background

- February 15, 2009, Community Hydro LLC, made application to the Federal Energy Regulatory Commission (FERC).
- October 7, 2009, the Raleigh City Council authorized the City staff to ask FERC for a competing permit.
- On November 19, 2010, the City was awarded a Preliminary Permit to conduct studies and prepare a license application for a hydroelectric project (FERC Project No. P-13623)

Clean Energy Potential

Green House Gas Reduction Opportunity:

Approximately 3,850 tons of CO2
equivalents per year



City Goals and Policies

**20% Reduction in Fossil Fuel
Consumption**

**Greenhouse Gas Emissions
Reduction Strategy**

**Endorsed the U.S. Mayors
Climate Protection Agreement to
develop a greenhouse gas
emissions reduction strategy for
the City**

Project Overview



Existing Falls Lake Dam Facilities



Project Overview – Outlet Tower



Project Overview - Tailrace



Project Overview - Tailrace



Designated Purposes of Falls Lake

What are the purposes of Falls Lake?

By the mid 1930's, the increasing population and spread of urban development into the Falls Lake area had begun to exert a great deal of pressure on the region's water resources. The Corps of Engineers, in cooperation with state and local leaders, developed a comprehensive watershed management plan for the entire Neuse River Basin. Falls Lake was the first of three proposed and was authorized by the Flood Control Act of 1936. Numerous budgetary problems delayed the start of the dam's construction. After a severe drought in 1938, public support for the project increased dramatically, and an internal lobbying effort was initiated at the urging of U.S. Representative Lee P. Andrews. This effort was successful, and funds for the project were approved. Construction took place in June of 1939. The primary purposes of Falls Lake are the following:



Flood Control

The Falls Dam prevents downstream flood damages. Since its construction, the dam has prevented millions of dollars worth of potential damages to homes, business, and crops.

Water Supply



Falls Lake is the principal water supply for the City of Raleigh and many surrounding communities. A City-operated facility draws water from the lake and transports it to a treatment plant, where the water is processed and then distributed to users.



Wildlife Enhancement

Through its partnership with the State of North Carolina, the Corps of Engineers provides active natural resources management in order to provide long-term stewardship of fish and wildlife resources and their habitats for the public's enjoyment.

Recreation

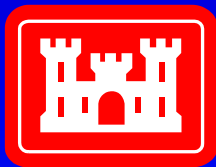


In cooperation with state agencies, the Corps of Engineers works to provide a wide variety of quality water-related recreational opportunities and facilities for visitors to Falls Lake.



Water Quality

The Corps of Engineers plays a vital role in maintaining downstream water quality. By maintaining the water released, the Corps can help ensure that downstream flow is sufficient to absorb wastewater discharges and that the oxygen, temperature, and nutrient levels in the Neuse River are suitable for fish, wildlife, and other public uses of this important water resource.



U.S. Army Corps
of Engineers
Wilmington District

Neuse River Basin Profile of Falls Lake

Falls Lake Project Profile

Elevation at Top of Dam is 291.5 Feet, msl —

Spillway Crest at 264.8 Feet, msl

Controlled Flood Storage

Elevation 251.5 to 264.8 Feet, msl

221,182 Acre-Feet or 5.4 Inches of Runoff Storage

Normal Operating Level of 251.5 Feet, msl

Conservation Storage

Water Supply Storage

45,000 Acre-Feet or
42.3 % of Conservation Pool

Water Quality Storage

61,322 Acre-Feet or
57.7 % of Conservation Pool

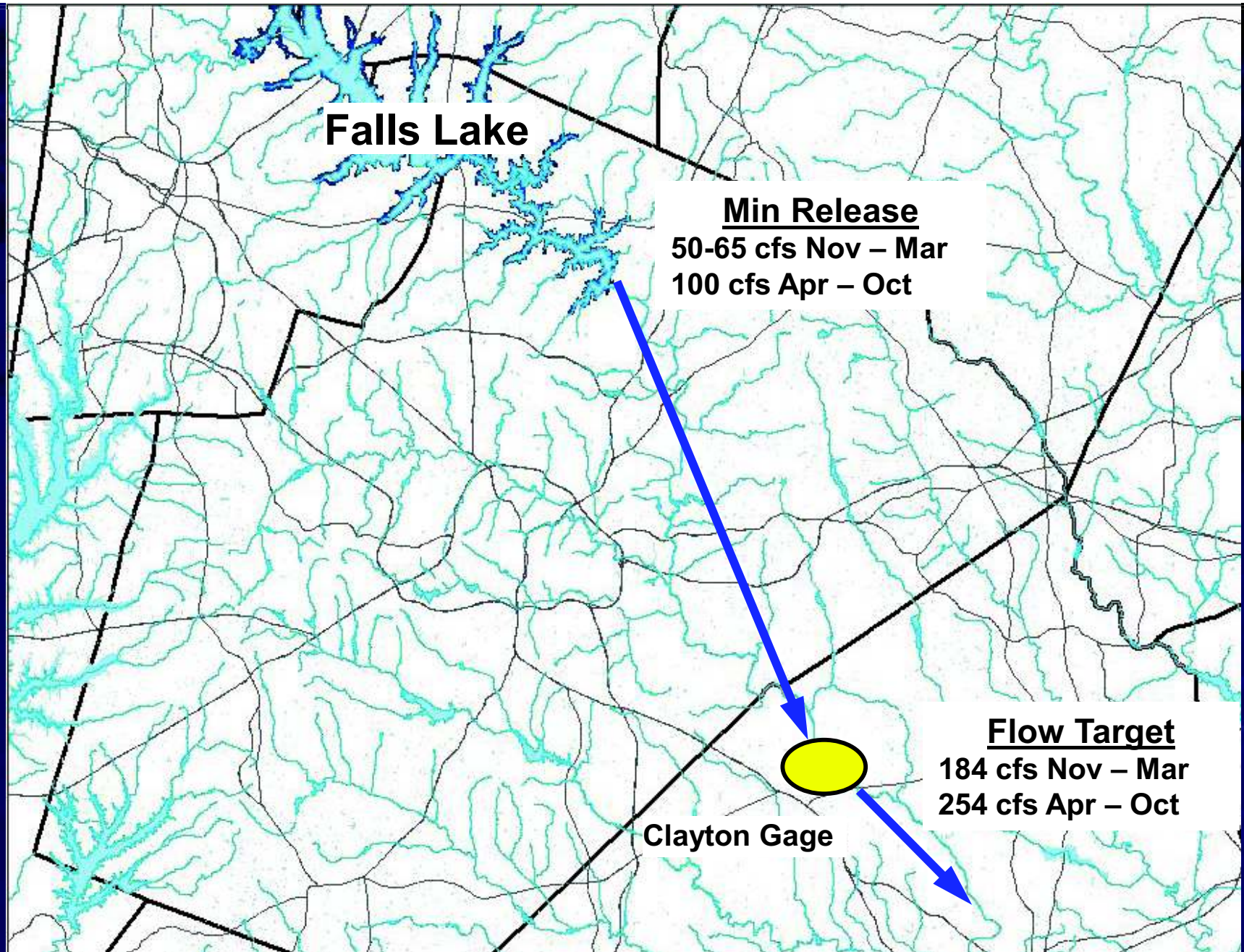
Bottom of Conservation Pool is 236.5 Feet, msl

Sedimentation Storage

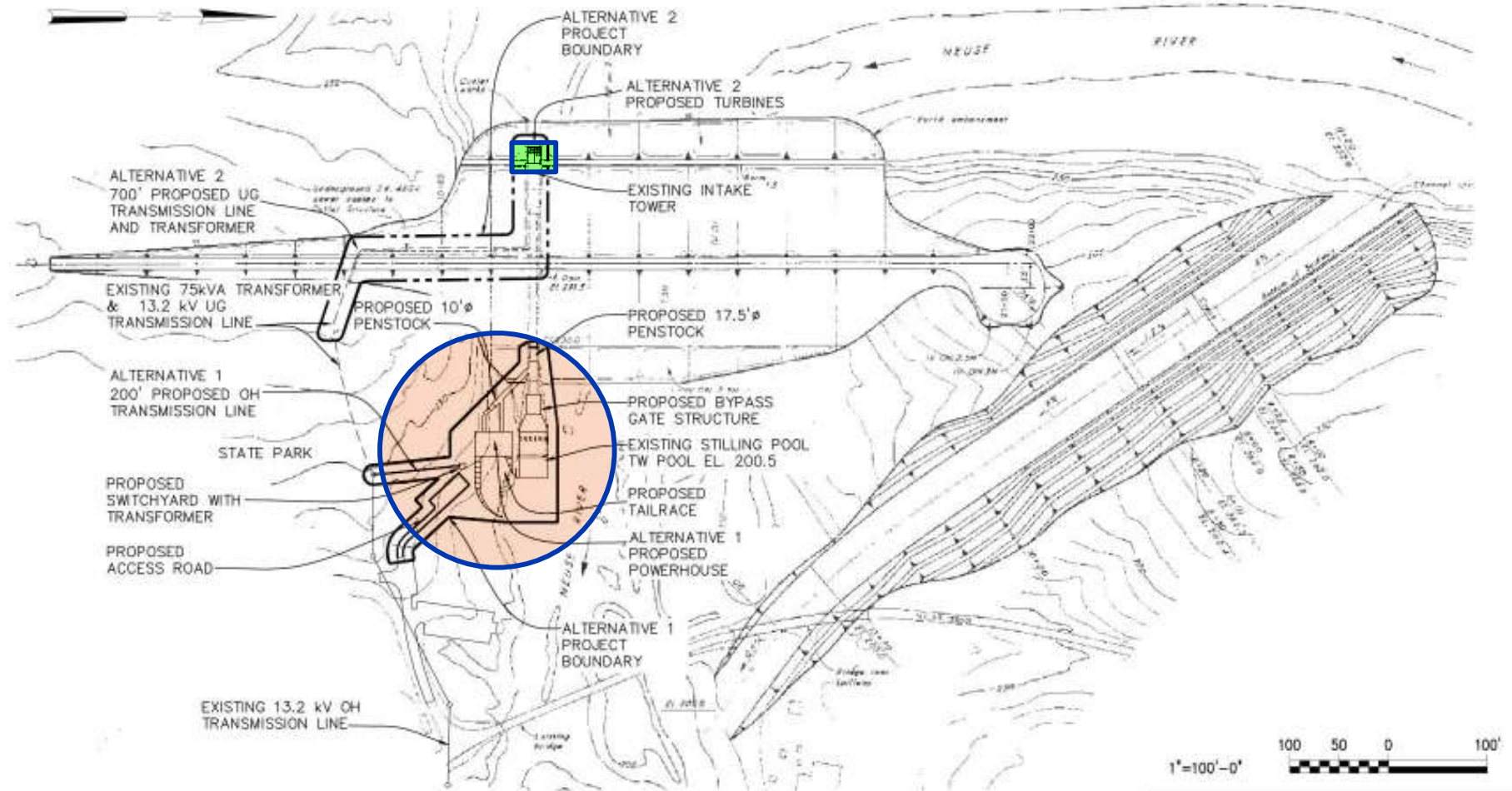
Elevation 200 to 236.5 Feet, msl or 25,073 Acre-Feet

Elevation at Base of Dam is 200 Feet, msl

Project Overview – Water Quality Pool



Alternative Concepts



HAZEN AND SAWYER
Environmental Engineers & Scientists

PRELIMINARY - ISSUED FOR REVIEW ONLY

FALLS LAKE DAM HYDROELECTRIC PROJECT
CITY OF RALEIGH

ALT 1 : DOWNSTREAM
POWERHOUSE AND ALT. 2
INTAKE TOWER SITE PLAN

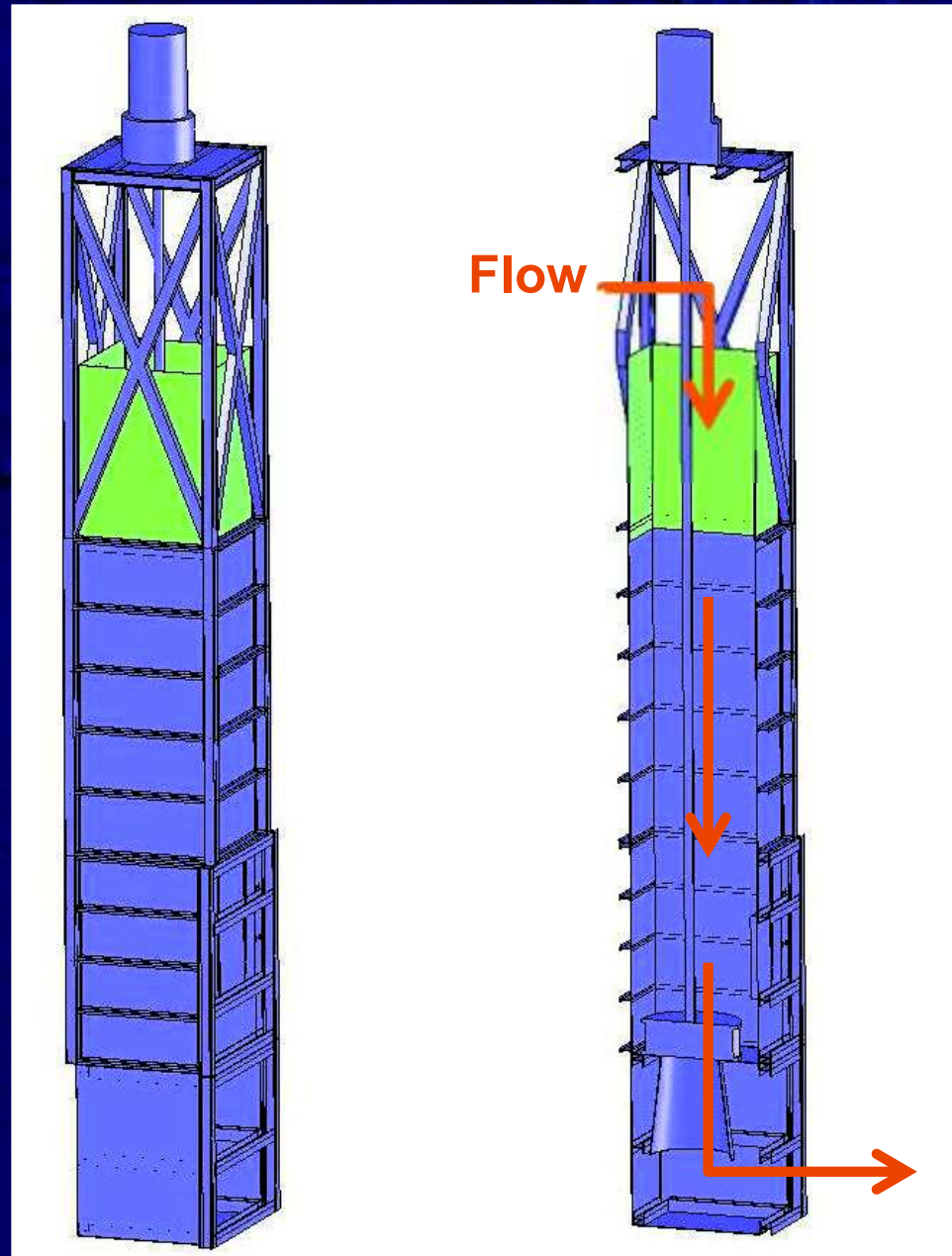
Project Overview – Concept and Operation

- 1. Install hydropower turbines on the Outlet Tower to generate electricity using the energy potential in the water released from the Water Quality Pool and Flood Control Pool.**
- 2. No alteration of the dam release rate. Generate renewable and GHG emission-free power with the water the USACE already releases.**
- 3. Sell power.**
- 4. Preliminary concept similar to Jordan Lake**

Proposed Operations

- Hydropower generation will be secondary to meeting the City's water supply needs and the USACE reservoir operations.
- Water available for hydropower generation will be that released by USACE for water quality and flood control purposes.
- Hydropower operations will not change the magnitude, timing, or frequency of downstream flow releases

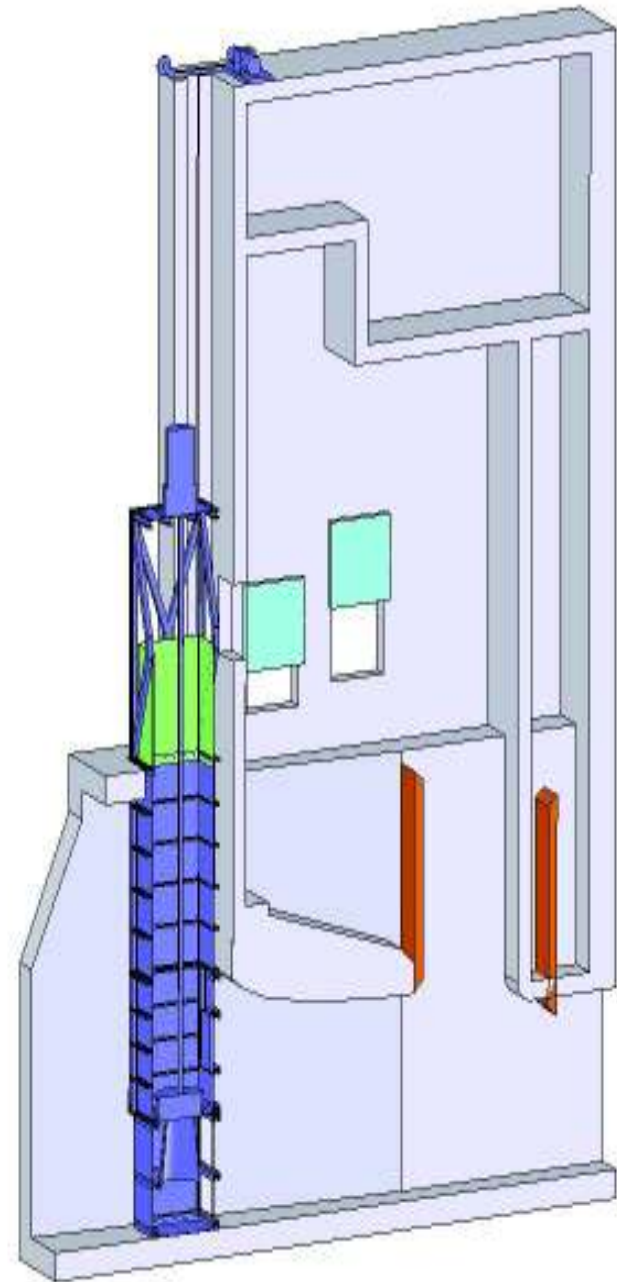
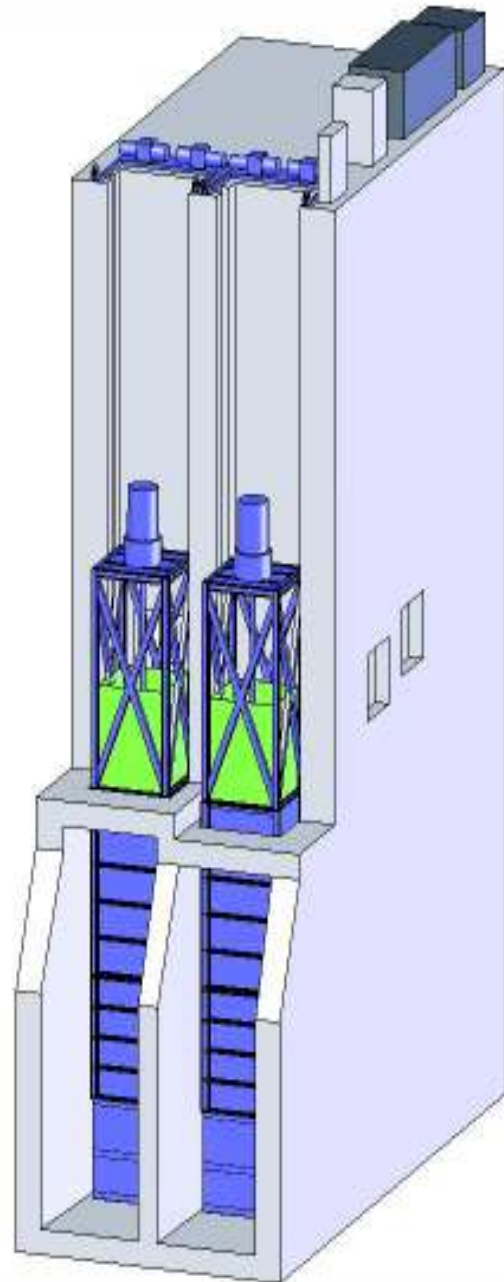
Outlet Tower Turbine Concept (based on Jordan Lake)



Outlet Tower Turbine-Generator Concept

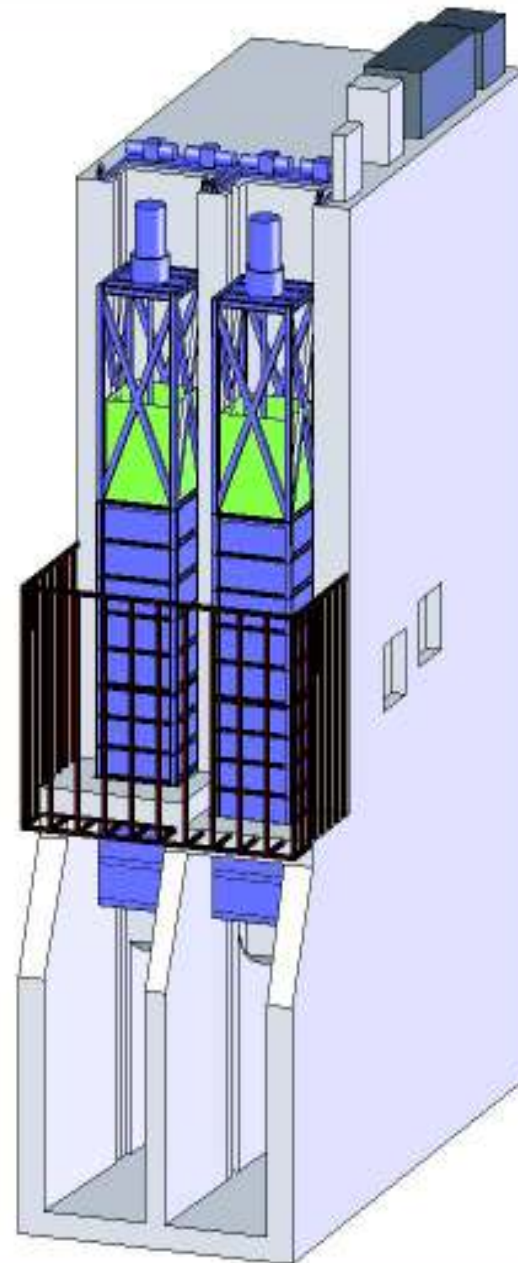


Outlet Tower Turbine Concept (based on Jordan Lake)



Outlet Tower Turbine Concept (based on Jordan Lake)

- To pass flood flow, one or both modules may be raised using hydraulic cylinders on Tower roof



Jordan Lake Hydroelectric Facility

Pre-Hydroelectric Project



Jordan Lake Hydroelectric Facility

Under Construction – May 24, 2011



Jordan Lake Hydroelectric Facility

As of January 20, 2012



Jordan Lake Hydroelectric Facility

As of January 20, 2012



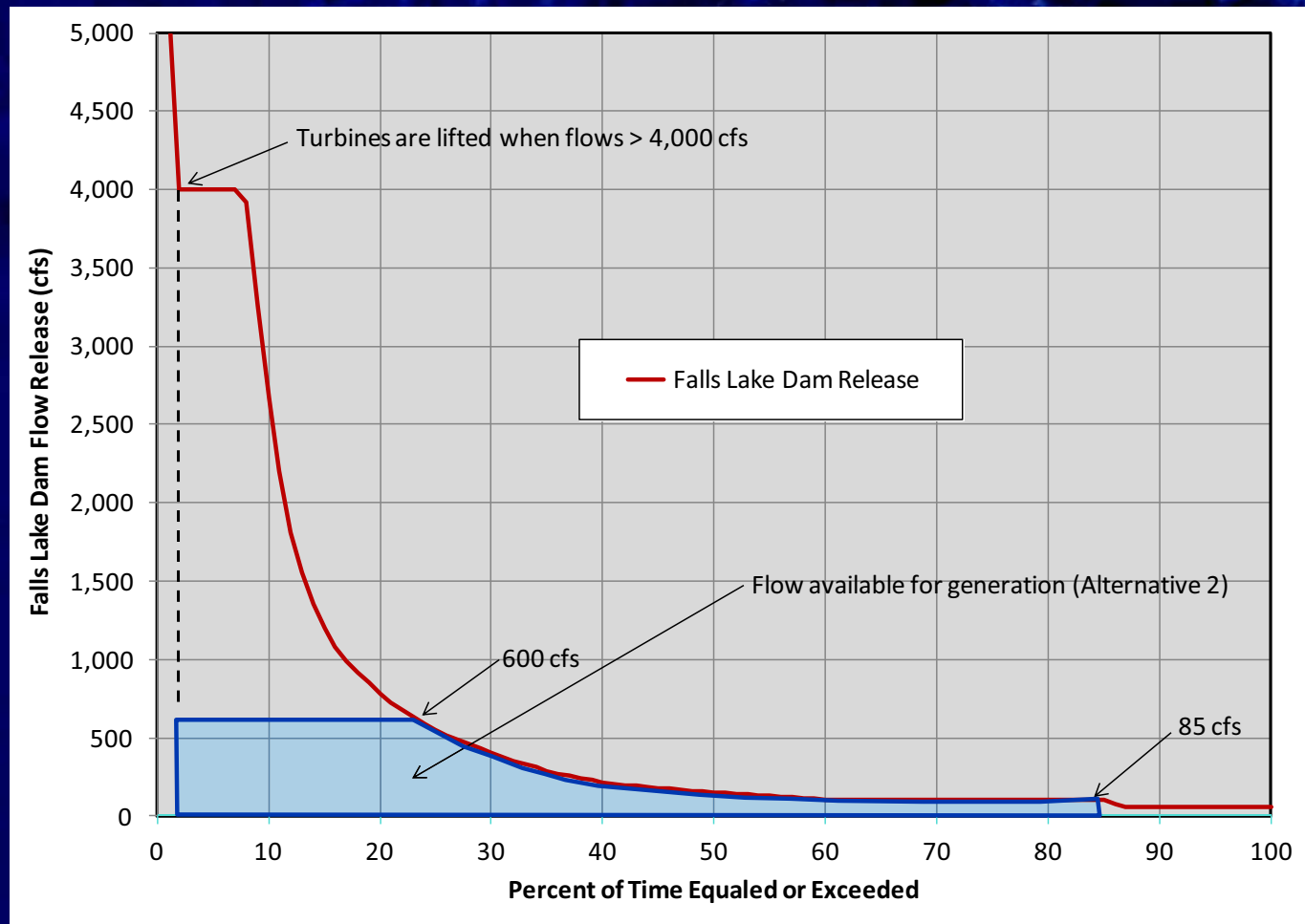
Jordan Lake Hydroelectric Facility

As of January 20, 2012



Falls Lake Hydropower Generation Potential

- Prefeasibility Study estimate of average annual power generation is about 4600 MWH/yr.



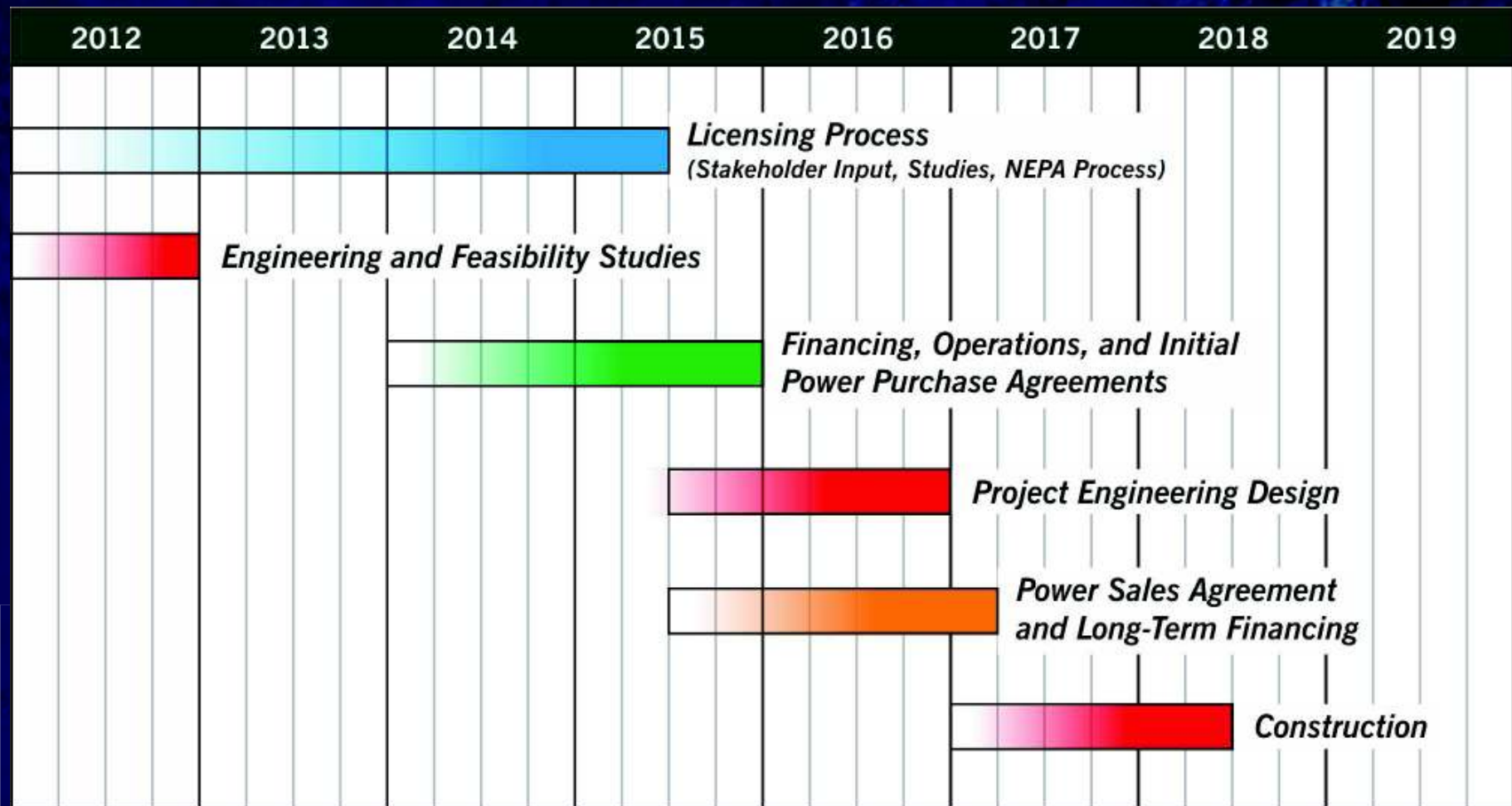
Project Pre-Feasibility Evaluation

- The City is evaluating the feasibility of the Project Development
- The analysis for the Development includes:
 - Identifying alternatives to convey water to the hydropower facilities and number/size of turbines
 - Estimating average annual generation (MWh/year) for various alternatives
 - Estimating development costs for various alternatives
- The assessment will inform the City as to which design alternative is likely to be economically viable and should be further analyzed
- Based on a pre-feasibility analysis, an alternative that installs turbines on the intake tower may be economically feasible

Licensing Process

- **City Received Preliminary Permit**
 - (expires Nov. 2013)
- **Feasibility Study**
- **Pre-Application Document (PAD) Development**
- **Notice of Intent Filed**
- **Traditional Licensing Process**

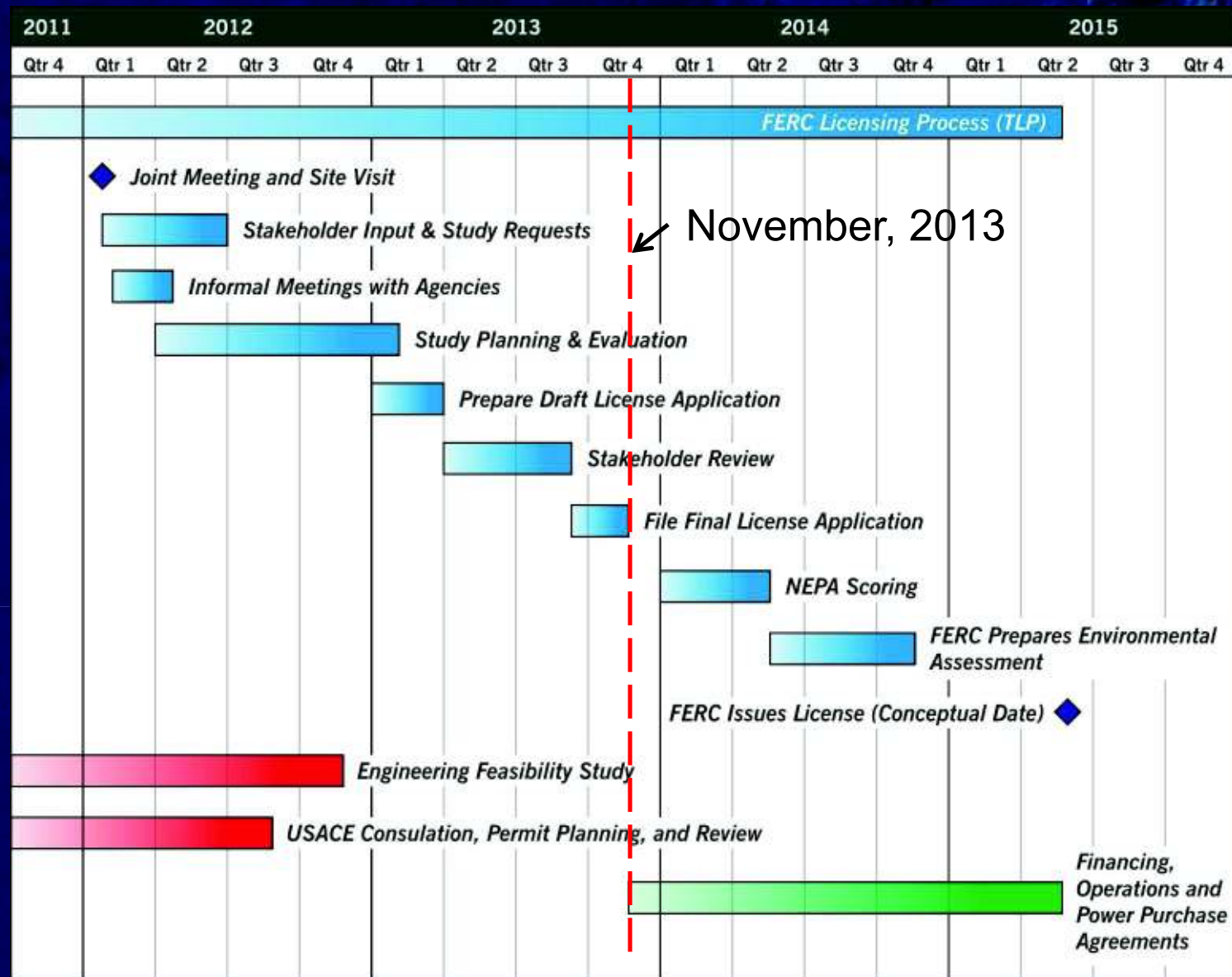
Project Timeline



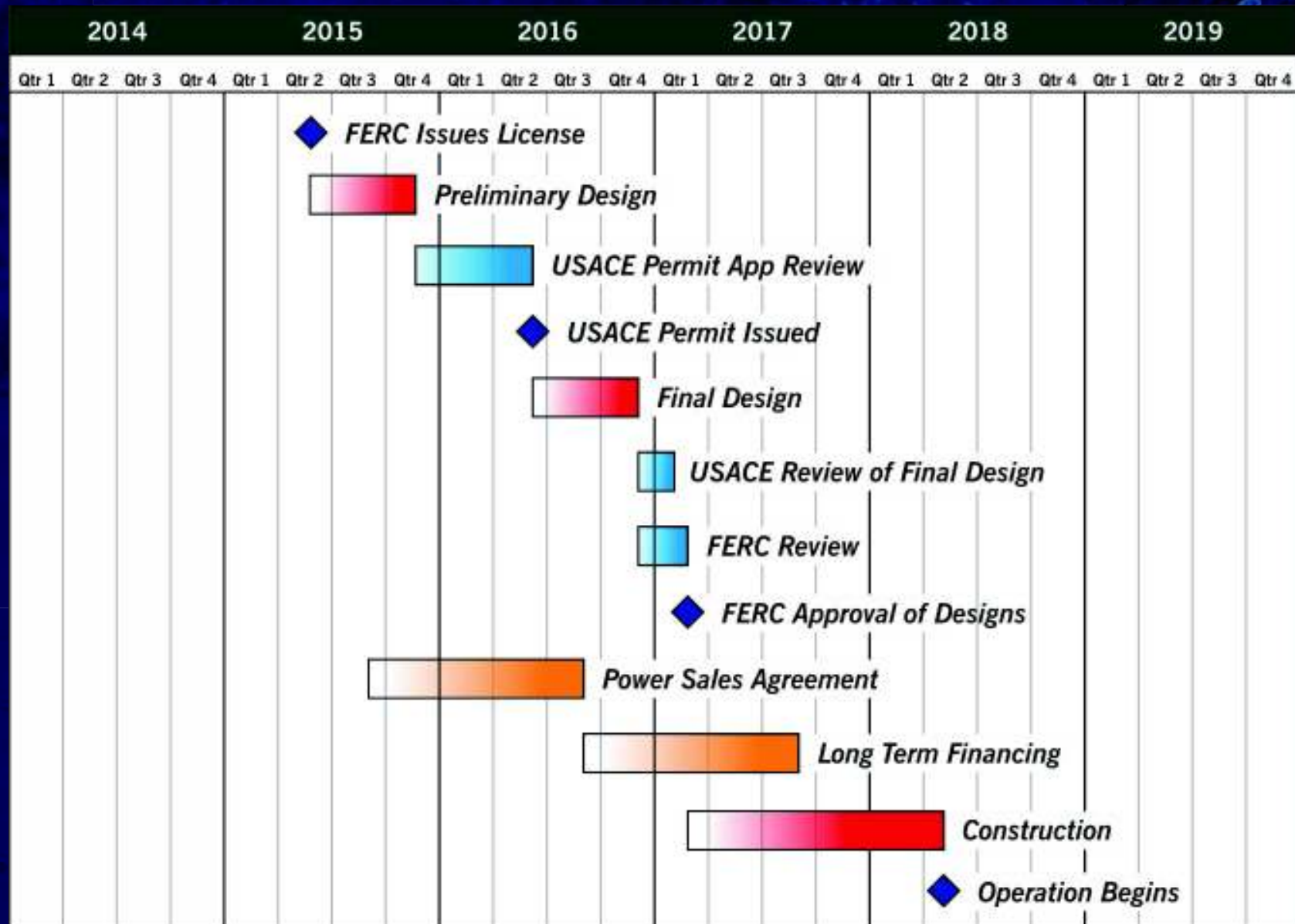
Near-Term Project Timeline



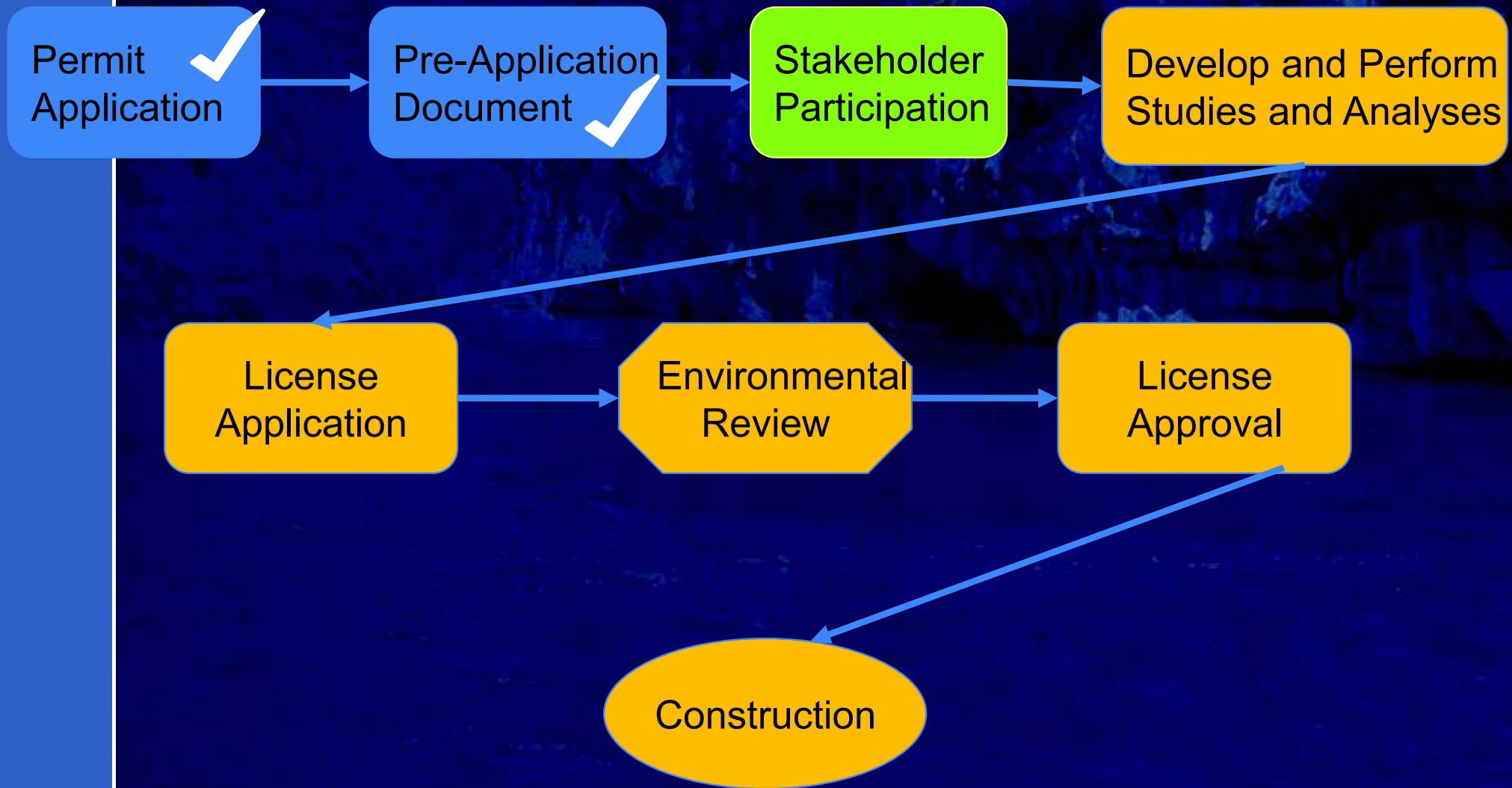
FERC licensing - Project Timeline



Post-Licensing Project Timeline



Overview of Licensing Process

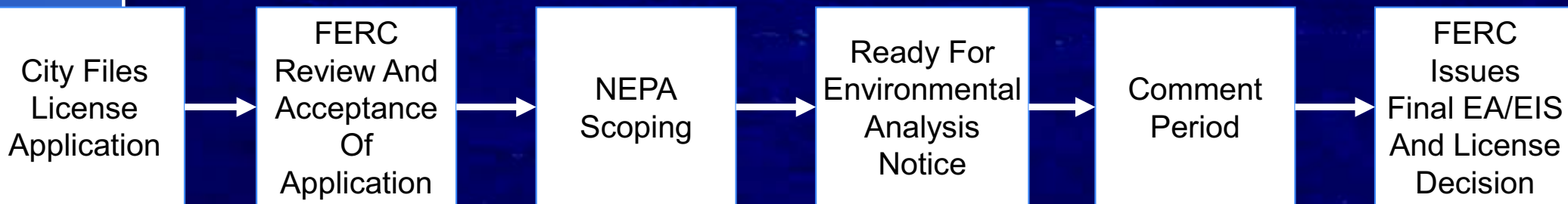


Pre-Licensing Process Schedule

Site Visits and Joint Meeting	January 23, 2012
Stakeholders submit written comments and study requests to the applicant (City of Raleigh) within 60 days.	March 23, 2012
City reviews study requests and develops draft study plans	April 2012
Stakeholder comments on study plans	May 2012
City finalizes study plans	June 2012
City conducts studies	2012
City submits Draft License Application	April 1, 2013
Stakeholders submit comments on Draft License Application to City and FERC (90-day comment period)	July 1, 2013
City submits Final License Application Apply for State 401 Water Quality Certificate	November 1, 2013

Environmental Review

- **The National Environmental Policy Act (NEPA) requires comprehensive evaluation of potential environmental impacts.**
 - **The environmental review is conducted after the City files an Original License Application for the Project with the FERC**
 - **Until an application is filed, there is no “action” requiring an environmental review**



Pre-Application Document (PAD)

- Provides background on existing information
- Preliminary evaluation:
 - Geology and Soils
 - Water Resources
 - Fish and Aquatic Resources
 - Wildlife and Botanical Resources
 - Wetlands, Riparian and Littoral Habitats
 - Rare, Threatened and Endangered Species
 - Recreation and Land Use
 - Aesthetic, Cultural, Socio-Economic and Tribal Resources
- Identify and evaluate potential impacts
- Describes proposed studies

Issues Identified during PAD Development

■ Water Resources

- Effects of Project construction on water quality in the Neuse River.
- Prevent interruption of downstream flows during construction, maintenance & operation of the project.
- Erosion and Sediment Control Plan (construction).

■ Fish and Aquatic Resources

- Effects of Project operations on fish impingement, entrainment and turbine mortality.
- Trashracks for Fish Protection.

Issues Identified during PAD Development

- **Recreation and Land Use**
 - Impacts of the proposed Project construction on recreational uses of Falls Lake and downstream areas.
 - Identification of any areas that are currently open to public access that will become off limits due to Project security – either during construction or once the Project is operating.
- **Aesthetic Resources**
 - Effects of Project construction on aesthetic resources.

Issues Identified post-PAD

- **Influence of Reservoir Water Quality on Release Schedule (USACE Policy)**
- **Endangered Species Protection**
 - **Formal Consultation Process with USFWS and NOAA Fisheries**
- **Noise**
- **Downstream Aquatic Habitat**
- **Fish Passage**
- **Cultural and Tribal Resources**

Overview of Proposed Studies

- City of Raleigh plans to generate power from water released under current operation protocol the reservoir - in accordance with current USACE operations – no changes in release schedule.
- Accordingly, the proposed studies relate to resource impacts due to the addition of hydropower operations
- The proposed studies generally address impacts associated with construction-related activities

Potential Data Needs and Studies

Desktop Environmental Studies

1. Water Resources

- Water Quality Impact Analysis (Construction and Operation)
- Identification of Construction-Related Instream Flow Maintenance Measures (as appropriate)
- Erosion Control Plan

2. Fish and Aquatic Resources

- Impact Analysis
- Identification of Potential Fish Protection Measures

3. Recreation Impact Analysis

4. Aesthetic Resources Impact Analysis

Potential Data Needs and Studies

Engineering Review Studies

1. Geotechnical Conditions at Intake/ Outlet Pipes and Energy Dissipator
2. Structural Conditions of Intake/Outlet Facilities
3. Existing Mechanical Systems at the Dam
4. Hydraulic Flows at Intake/Outlet and Energy Dissipator
5. Access to the Intake Tower
6. Operation and Maintenance Requirements of the Tower

Comment Process

- **First Stage Consultation**
- **Study Requests per 18 CFR 4.38 (b)(5) for Resource Agencies/Tribes/Public**
- **Provide Comments/Study Requests to the City of Raleigh within 60 days**
- **Public Can Provide Comments**

Content of Written Comments

18 CFR 4.38 (b)(5)

- (i) Identify necessary studies or additional information
- (ii) Provide basis for study or comment;
- (iii) Discuss understanding of the resource issues and its goals and objectives for these resources;
- (iv) Explain rationale for proposed study methodology;
- (v) Document that study methodology recommended is a generally accepted practice; and
- (vi) Explain how the studies/information will be used in furthering your resource goals and objectives that are affected by the proposed project.

Submit comments to:

- City of Raleigh: Kenny Waldroup
kenneth.waldroup@raleighnc.gov
- Black and Veatch: Kent Lackey
LackeyKA@BV.COM

Additional Information on the Process

- www.ferc.gov
- Project No. 13623
- Electronic Subscription/E-Library
- Brochure How to Get Involved

Questions and Discussion



Next Steps

1. Informal Meetings with Agencies
2. Stakeholder Study Requests Due (March 23, 2012)
3. Study Planning and Stakeholder Meeting
4. Draft Feasibility Report (Summer 2012)
5. USACE Initial Meeting and Section 408 Permit Planning

Bullpen

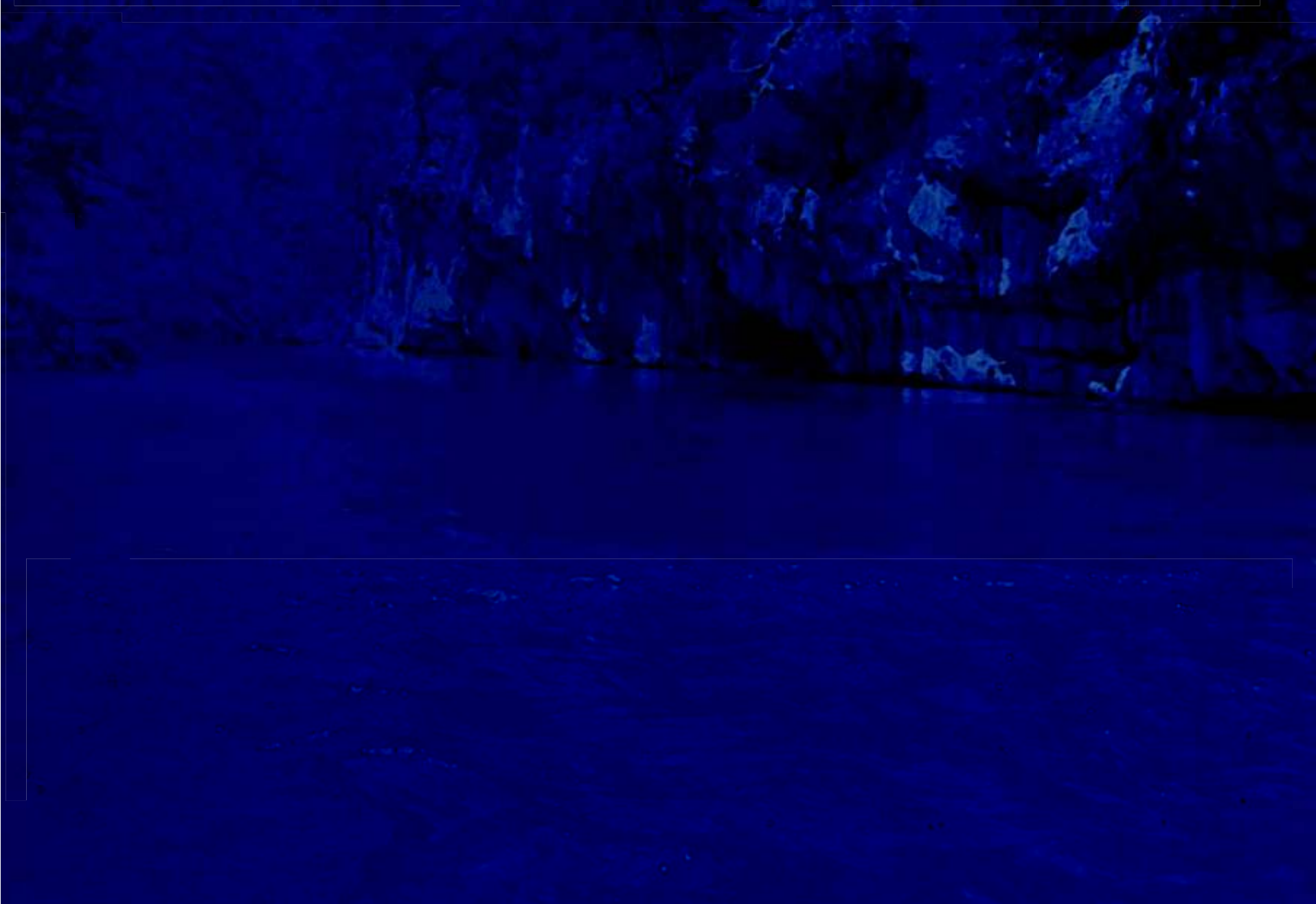


Table ES-1: Hydropower Development Hydraulic and Electrical Capacities

Alternative Vendor	No. of Turbines and Runner Diameter Size	Rated Net Head (ft)	Hydroelectric Hydraulic Capacity (cfs)	Hydroelectric Generation Capacity (MW)
Alternative 1 Voith	2 turbines total 2 – 1085 mm (3.6 ft)	50.0	500	1.90
Alternative 2 CHEC	2 turbines total 2 – 1250 mm (4.1 ft)	40.0	600	1.70

Table ES-2: Falls Lake Dam Average Annual Generation and OPCC

Vendor/Layout	Alternatives – No. of Turbines and Runner Diameter Size	*Avg. Annual Generation over Period of Record (from OASIS Model)	OPCC Estimate (\$2011)
Alternative 1 Voith	2 turbines total 2 – 1085 mm (3.6 ft)	7256 MWH/yr	\$28,372,000
Alternative 2 CHEC	2 turbines total 2 – 1250 mm (4.1 ft)	4608 MWH/yr	\$7,825,000

* All generation estimates assume a 5% downtime due to scheduled and unscheduled outages.

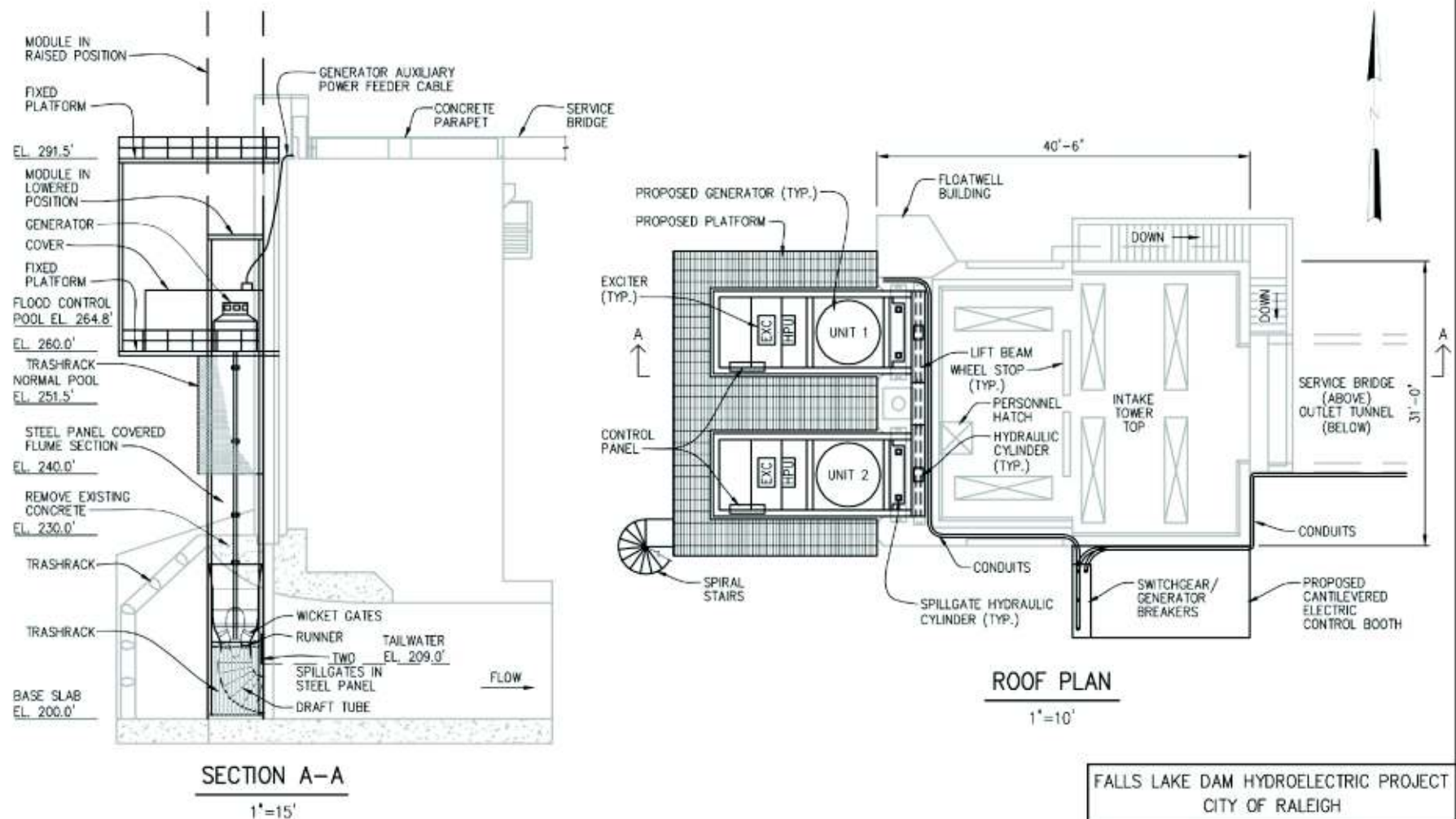
Stop-log Grooves in Outlet Tower



Pre-feasibility Study Preferred Alternative



Concept Drawings



HAZEN AND SAWYER
Environmental Engineers & Scientists

PRELIMINARY - ISSUED FOR REVIEW ONLY

FALLS LAKE DAM HYDROELECTRIC PROJECT
CITY OF RALEIGH

ALTERNATIVE 2
INTAKE TOWER
PLAN AND SECTION

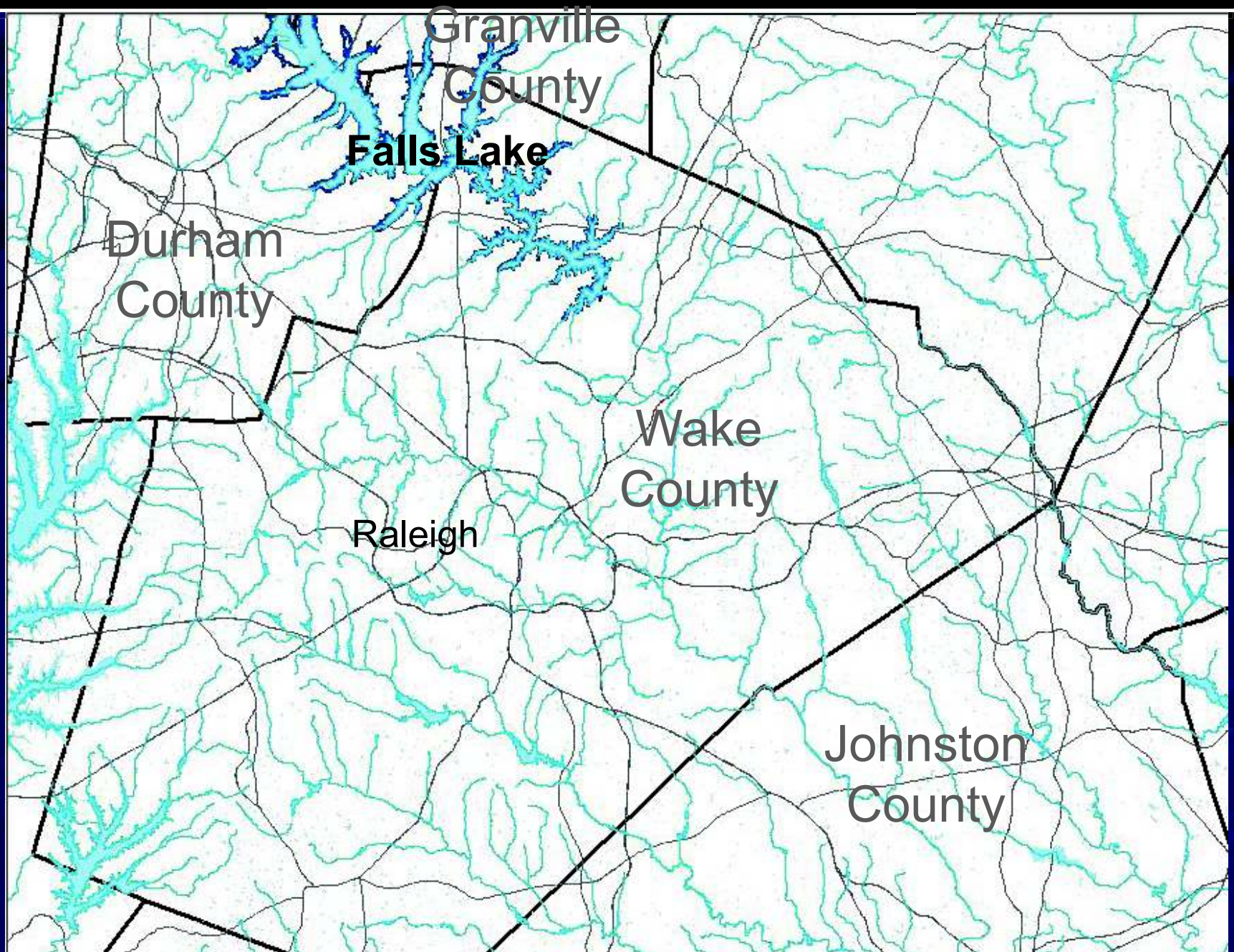
Pre-Application Document (PAD)

- Provides background on existing information
- Discusses engineering, operational, economic, and environmental information pertaining to the Project that was reasonably available and known at the time the Notice of Intent was filed
- Contains a preliminary evaluation of the following potential environmental impacts associated with the Project:
 - Geology and Soils
 - Water Resources
 - Fish and Aquatic Resources
 - Wildlife and Botanical Resources
 - Wetlands, Riparian and Littoral Habitats
 - Rare, Threatened and Endangered Species
 - Recreation and Land Use
 - Aesthetic, Cultural, Socio-Economic and Tribal Resources
- Helps identify and evaluate potential impacts of hydropower facilities
- Describes proposed studies to be performed by the City to support its license application

Notes on Project Size

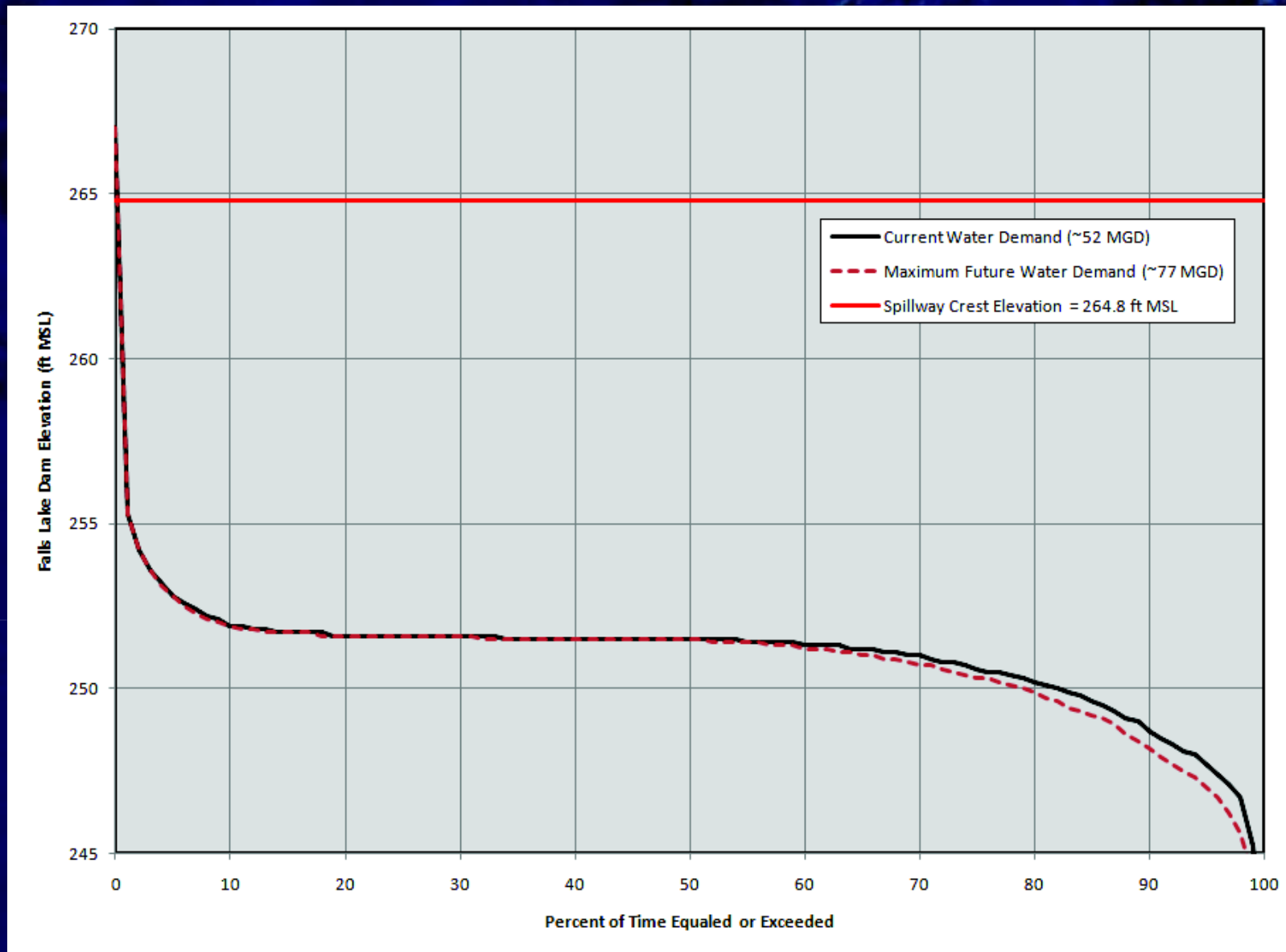
- Estimated 1.7 MW capacity that would generate 4.6 GWh/yr
- In 2006 coal generation capacity in NC estimated at 7010 GW. 1.7 MW is 0.000024% of this capacity or roughly 1 part in 4 million.
- In NC in 2009, estimated energy consumed was 746×10^6 MWh (source EIA). 4600 MWh is 6 parts in 1 million of this total – or 0.0006%
- 4.6 GWh/yr is sufficient to power about 432 average US households.

Project Overview



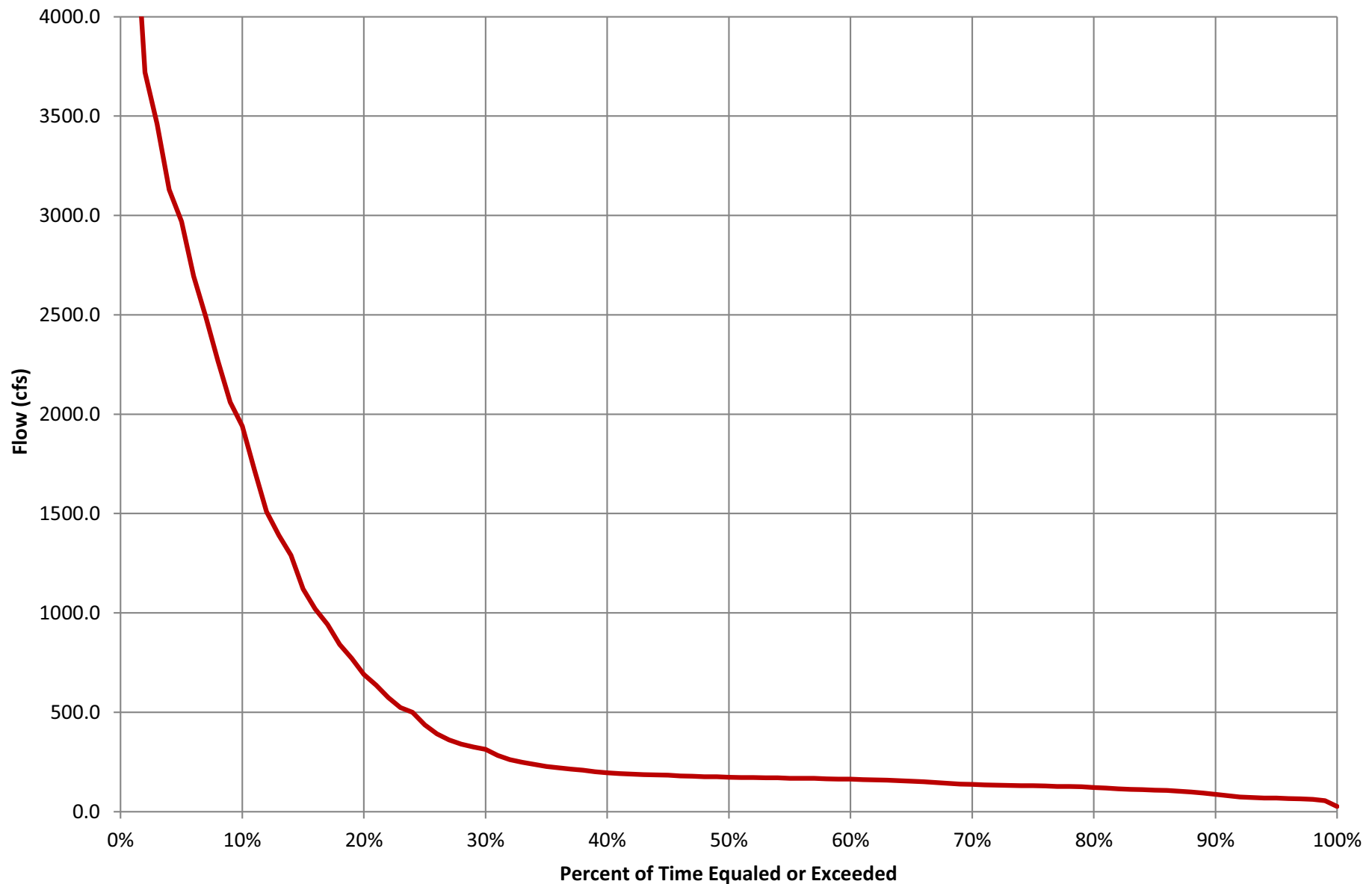
Falls Lake Elevation-Duration Curve

Est. based on Neuse River Basin Model



Flow Duration Curve

1985 – 2010 based on USGS gage 02087183



Preliminary Project Financial Feasibility

	Bond Issuance Rate								
Energy Price	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%	4.7%	5.0%	5.5%
Low Price	\$4,315,409	\$2,510,029	\$1,072,392	-\$73,768					
Reference Price	\$7,763,041	\$5,348,152	\$3,420,110	\$1,877,827	\$642,231	-\$348,722	-\$687,911		
High Price	\$12,044,372	\$8,859,675	\$6,313,885	\$4,273,993	\$2,636,003	\$1,318,367	\$866,154	\$256,948	-\$598,851

- Federal incentives for renewable energy projects not included in NPV (yet)

